

A KEY TO NYMPHS OF FOUR SPECIES OF THE GENUS
PODISUS (HEMIPTERA: PENTATOMIDAE) OF
NORTHEASTERN NORTH AMERICA

EDWARD W. EVANS

Division of Biology, Kansas State University, Manhattan, Kansas 66506.

Abstract.—A simple key based on color characters is provided for nymphs of *Podisus maculiventris* (Say), *P. modestus* (Dallas), *P. placidus* Uhler, and *P. serieiventris* Uhler.

Five species of the genus *Podisus* occur in northeastern North America. Of these, four species (*P. maculiventris* (Say), *P. modestus* (Dallas), *P. placidus* Uhler, and *P. serieiventris* Uhler) are commonly collected (e.g., Kirkland, 1898; Tostowaryk, 1971; Morris, 1972; Evans, 1982, 1983). The fifth species, *P. fretus* Olsen, is an especially large (adult length: 12.5–14 mm) and seemingly rare member of the genus that has been reported sporadically from Maine to Florida and west to Indiana and Michigan (McPherson, 1982). Because they are predators that often attack economic pests, these insects are of considerable interest to many entomologists. At present, however, reporting of these insects' habits is hampered by inability to identify nymphs encountered in the field. Therefore I have developed the following simple key for nymphs of all but *P. fretus* (with which I am unfamiliar). Adults are well treated by several published keys (e.g. Torre-Bueno, 1939; Furth, 1974; McPherson, 1982), and a key to eggs of these four species is given by Coppel and Jones (1962).

Because nymphs of the four species are essentially indistinguishable in structural characters, the key given below is based on differences in color pattern among the species. These differences are readily apparent in freshly collected or frozen material. The colors fade slowly when specimens are stored in alcohol, but fading can largely be prevented if specimens preserved in alcohol are kept refrigerated.

The key is based on nymphs that I reared from eggs laid by adults collected near Ithaca, New York. Voucher specimens of adults of the four species have been placed in the Cornell University Insect Collection under Lot 1086. Extensive collections and subsequent rearings of *Podisus* nymphs have proved the key to be reliable. Detailed descriptions of the nymphs of three of the species are available elsewhere: *P. serieiventris* (Prebble, 1933), *P. maculiventris* (DeCoursey and Esselbaugh, 1962), and *P. placidus* (Oetting and Yonke, 1971).

The terms used in the key are identified for a fourth instar nymph of *Podisus* in Fig. 1. One can confirm that an unidentified nymph belongs to the Pentatomidae by using the key provided by Herring and Ashlock (1971). One must know also that indeed the specimen belongs to the genus *Podisus* before using the key given

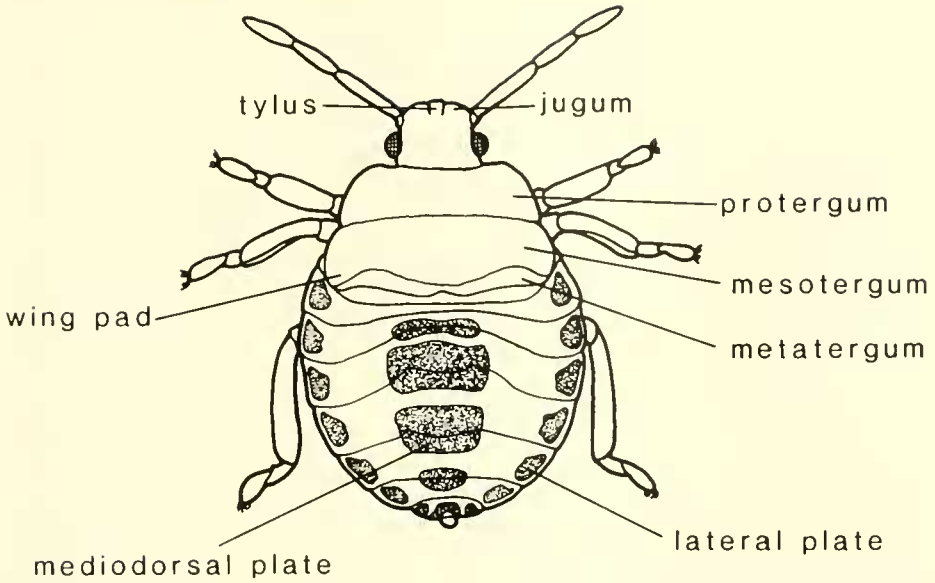


Fig. 1. Fourth-instar nymph of *Podisus* labeled with characters mentioned in text and in keys. The figure is redrawn from Oetting and Yonke (1971); this source should be consulted for more detailed illustrations of all five nymphal instars of *Podisus*.

below; of help here is the generic key for nymphs by DeCoursey and Allen (1968). One can determine quickly whether a specimen belongs in the subfamily Asopinae (which includes the genus *Podisus*) by examining the beak (rostrum). As noted by DeCoursey and Allen (1968: 144; see their Figs. 1 and 2), the first segment of the rostrum in the predatory Asopinae is "stout, free, (with) only the base imbedded between the bucculae" whereas the first segment of the rostrum in phytophagous Pentatomidae (i.e. other subfamilies) is "slender, imbedded between the bucculae." Unlike the beak of plant-feeding stink bugs, the broad sword-like beak of *Podisus* and other asopines can be extended fully forward (thus facilitating feeding on prey). DeCoursey and Allen (1968) further note that nymphs of the genus *Podisus* can be distinguished from other asopines in the eastern United States in that they are not metallic in color (vs. *Euthyrhynchus*), they lack a spine or tubercle on the fore femora (vs. *Stiretrus* and *Perillus*), and they have juga approximately equal in length to the tylus (vs. *Apateticus*).

Use of the key also requires that the investigator know which instar is at hand. Good descriptions of the different instars of Pentatomidae appear in DeCoursey and Esselbaugh (1962), and excellent illustrations of *P. placidus* in particular appear in Oetting and Yonke (1971). A simple key for identifying instars is presented below.

KEY TO INSTARS FOR *PODISUS* NYMPHS

- 1. Posterior margin on mesotergum laterally without wing pads 2
- Posterior margin of mesotergum laterally with wing pads reaching to or beyond posterior margin of metatergum 4

2. Dorsal surface impunctate. Length 1–2 mm first instar
- Dorsal surface with fine punctures. Length 2–5 mm 3
3. Posterior margin of mesotergum medially not bulging over base of metatergum. Length 2–3 mm second instar
- Posterior margin of mesotergum medially bulging over base of metatergum. Length 3.5–5 mm third instar
4. Wing pads extending to but not beyond posterior margin of metatergum. Length 5–7 mm fourth instar
- Wing pads extending beyond posterior margin of metatergum. Length 7.5–9.5 mm fifth instar

KEY TO FIRST- AND SECOND-INSTAR NYMPHS OF *PODISUS*

(No differences are apparent to distinguish the red and black first-instar nymphs of *P. maculiventris*, *P. modestus*, and *P. placidus*).

1. Dorsum of abdomen predominantly white with thin *red* transverse lines extending from black mediodorsal plates to black lateral plates .. *serieiventris*
- Dorsum of abdomen predominantly red 2 (second instar only)
2. Dorsum of abdomen entirely red except for black mediodorsal and lateral plates (and sometimes white between black mediodorsal plates) *maculiventris*
- Dorsum of abdomen with some white as well as red and black 3
3. Dorsum of abdomen predominantly red but with some distinct thin white lines outlining black lateral plates *placidus*
- Dorsum of abdomen primarily red but with *creamy-white* patches to each side of anterior mediodorsal plate immediately posterior to black thoracic metatergum *modestus*

KEY TO THIRD-INSTAR NYMPHS OF *PODISUS*

1. Dorsum of abdomen white with red transverse lines extending from black mediodorsal plates to black lateral plates and with distinct *yellow-orange* patches on each side anteriorly (immediately posterior to black thoracic metatergum) *maculiventris*
- Dorsum of abdomen without yellow-orange patches anteriorly 2
2. Dorsum of abdomen as above *except* that patches immediately posterior to black thoracic metatergum are *creamy-white* *modestus*
- Dorsum of abdomen *without* distinctly colored patches immediately posterior to black thoracic metatergum 3
3. Dorsum of abdomen white with *thin* red transverse lines extending from black mediodorsal plates to black lateral plates; dorsum of thorax *without* white lateral margins but often with 2–3 pairs of large clear zones surrounded by black *serieiventris*
- Dorsum of abdomen white with *thick* red lines that fuse to varying degrees with each other (generally imparting a distinctly reddish appearance to the abdomen in contrast to appearance of *P. serieiventris*); dorsum of thorax completely black except for white lateral margins that may be present on protergum and mesotergum *placidus*

KEY TO FOURTH- AND FIFTH-INSTAR NYMPHS OF *PODISUS*

1. Protergum and mesotergum (sometimes only protergum in fourth instar) of black thorax with distinct white lateral margins *placidus*
 – Thorax without white lateral margins 2
2. Dorsum of abdomen with much brown and with *creamy-white* patches (partially obscured by wing pads in fifth instar) to each side anteriorly (immediately posterior to black thoracic metatergum) *modestus*
 – Dorsum of abdomen not as above 3
3. Dorsum of abdomen with *yellow-orange* patches (partially obscured by wing pads in fifth instar) to each side anteriorly (immediately posterior to black thoracic metatergum) *maculiventris*
 – Dorsum of abdomen entirely black, red, and white (i.e. *without* yellow-orange or creamy-white patches) *serieiventris*

ACKNOWLEDGMENTS

I thank T. J. Henry (Syst. Ent. Lab., IIBIII, ARS, USDA, Wash., D.C.), E. R. Hoebeke (Cornell Univ., Ithaca, N.Y.), and A. G. Wheeler, Jr. (Bureau Plant Ind., Pa. Dept. Agric., Harrisburg) for encouraging me to prepare this key, and T. J. Henry, E. R. Hoebeke, and an anonymous reviewer for their comments on the manuscript. I also thank T. R. Yonke and R. D. Oetting for allowing me to redraw Fig. 1 from their published illustration. Financial support was provided in part by N.S.F. Grant DEB 77-25210 to R. B. Root.

LITERATURE CITED

- Coppel, H. C., and P. A. Jones. 1962. Bionomics of *Podisus* spp. associated with the introduced pine sawfly, *Diprion similis* (Htg.), in Wisconsin. Trans. Wis. Acad. Sci. Arts Lett. 51: 31-56.
- DeCoursey, R. M., and R. C. Allen. 1968. A generic key to the nymphs of the Pentatomidae of the eastern United States (Hemiptera: Heteroptera). Univ. Conn. Occas. Pap. (Biol. Sci. Ser.) 1: 141-151.
- DeCoursey, R. M., and C. O. Esselbaugh. 1962. Descriptions of the nymphal stages of some North American Pentatomidae (Hemiptera-Heteroptera). Ann. Entomol. Soc. Am. 55: 323-342.
- Evans, E. W. 1982. Timing of reproduction by predatory stink bugs (Hemiptera: Pentatomidae): patterns and consequences for a generalist and a specialist. Ecology 63: 147-158.
- . 1983. Niche relations of predatory stink bugs (*Podisus* spp., Pentatomidae) attacking tent caterpillars (*Malacosoma americanum*, Lasiocampidae). Am. Midl. Nat. 109: 316-323.
- Furth, D. G. 1974. The stink bugs of Ohio (Hemiptera: Pentatomidae). Bull. Ohio Biol. Surv. N. S. 5: 1-60.
- Herring, J. L., and P. D. Ashlock. 1971. A key to nymphs of the families of Hemiptera (Heteroptera) of America north of Mexico. Fla. Entomol. 54: 207-212.
- Kirkland, A. H. 1898. The species of *Podisus* occurring in the United States. Rep. Mass. State Board Agric. on Gypsy Moths. Appendix: 112-138.
- McPherson, J. E. 1982. The Pentatomoidea (Hemiptera) of northeastern North America with emphasis on the fauna of Illinois. Southern Illinois Univ. Press, Carbondale, Illinois.
- Morris, R. F. 1972. Predation by insects and spiders inhabiting colonial webs of *Hyphantria eunea*. Can. Entomol. 104: 1197-1207.
- Oetting, R. D., and T. R. Yonke. 1971. Immature stages and biology of *Podisus placidus* and *Stiretrus fimbriatus* (Hemiptera: Pentatomidae). Can. Entomol. 103: 1506-1515.
- Prebble, M. L. 1933. The biology of *Podisus serieiventris* Uhler, in Cape Breton, Nova Scotia. Can. J. Res. 9: 1-30.
- Torre-Bueno, J. R. de la. 1939. A synopsis of the Hemiptera-Heteroptera of America north of Mexico. Entomol. Am. N. S. 19: 141-310.
- Tostowaryk, W. 1971. Life history and behavior of *Podisus modestus* (Hemiptera: Pentatomidae) in boreal forest in Quebec. Can. Entomol. 103: 662-674.